CLAIMS

What is claimed is:

1. A slurry composition for a mold comprising

about 45-80% by weight alumina;

about 10-30% by weight silicon carbide; and

about 10-50% by weight colloidal silica.

2. The composition of claim 1, wherein the silicon carbide has an average particle diameter of about 30 micrometers to about 3.5 millimeters.

3. The composition of claim 1, wherein the silicon carbide is present at about 12-25% by weight of the composition.

4. The composition of claim 1, wherein the alumina component is present at about 50-70% by weight of the composition.

5. The composition of claim 1, wherein the alumina component comprises a material selected from the group consisting of brown fused alumina, white fused alumina, tabular alumina, calcined alumina, and mixtures thereof.

6. The composition of claim 5, wherein the average particle size of the alumina component is from about 100 micrometers to about 3 millimeters

7. The composition of claim 1, further comprising free carbon at about 2-6% by weight of the composition.

8. The composition of claim 7, wherein the free carbon is present in the form of pitch.

9. The composition of claim 1, further comprising fumed silica at about 2-5% by weight of the composition.

10. The composition of claim 1, further comprising welan gum at about 0.01-1% by weight of the casting composition.

11. The composition of claim 1, further comprising a setting agent at about 0.05-2% by weight of the composition.

12. The composition of claim 11, wherein the setting agent is magnesia.

13. The composition of claim 1, further comprising polypropylene fiber at 0.05-0.5% by weight of the composition.

14. The composition of claim 6, further comprising fumed silica at about 1-5% by weight of the casting composition and a setting agent at about 0.1-2% by weight of the composition.

15. The composition of claim 14, further comprising welan gum at about 0.01-1% by weight of the composition.

16. A casting method, the method comprising:

providing a meltable patterned substrate;

coating the substrate with a slurry composition;

allowing the slurry composition to set and form a mold; and

removing the substrate from the mold;

wherein the slurry composition comprises

about 45-80% by weight alumina;

about 10-30% by weight silicon carbide; and

about 10-50% by weight colloidal silica.

17. The method of claim 16, wherein the substrate is coated with the slurry composition by dipping the substrate into the slurry composition.

18. The method of claim 16, wherein the substrate is coated with the slurry composition by spraying the slurry composition onto the substrate.

19. The method of claim 16, wherein the substrate is coated with the slurry composition by brushing the slurry composition onto the substrate.

20. The method of claim 16, wherein the silicon carbide is present at about 10-25% by weight of the slurry composition.

21. The method of claim 16, wherein the alumina component is present at about 50-70% by weight of the slurry composition.

22. The method of claim 16, wherein the alumina component comprises a material selected from the group consisting of brown fused alumina, white fused alumina, tabular alumina, calcined alumina, and mixtures thereof.

23. The method of claim 22, wherein the alumina component comprises fused alumina at about 45-70% by weight of the slurry composition and calcined alumina at about 2-12% by weight of the slurry composition.

24. The method of claim 16, wherein the slurry composition further comprises about 2-6% by weight free carbon.

25. The method of claim 24, wherein the free carbon is present in the form of petroleum pitch.

26. The method of claim 16, wherein the slurry composition further comprises fumed silica at about 1-5% by weight of the slurry composition.

27. The method of claim 16, wherein the slurry composition further comprises about 0.01-1% by weight welan gum.

28. The method of claim 16, wherein the slurry composition further comprises a setting agent at about 0.1-2% by weight.

29. The method of claim 28, wherein the setting agent is magnesia.

30. The method of claim 16, wherein the slurry composition further comprises 0.05-0.5% by weight polypropylene fiber.

31. A casting method, the method comprising:

providing a meltable patterned substrate;

coating the substrate with a slurry composition;

allowing the slurry to form a mold; and

removing the substrate from the mold;

wherein the slurry composition comprises

about 45-65% by weight alumina;

about 10-30% by weight silicon carbide; and

about 10-40% by weight colloidal silica.

32. The method of claim 31, wherein the substrate is coated with the slurry composition by dipping the substrate into the slurry composition.

33. The method of claim 31, wherein the substrate is coated with the slurry composition by spraying the slurry composition onto the substrate.

34. The method of claim 31, wherein the substrate is coated with the slurry composition by brushing the slurry composition onto the substrate.

35. The method of claim 31, wherein a molten liquid casting material is poured into the mold before the mold is cooled.

36. The method of claim 31, wherein the slurry composition further comprises about 0.01-1% by weight welan gum.

37. The method of claim 31, further comprising providing a setting agent in the slurry composition, such that a set time can be controlled by varying the amount of setting agent.

38. The method of claim 37, wherein the set time is between 15 minutes and 10 hours.

39. The method of claim 38, wherein the setting agent is magnesia.

40. The method of claim 31, wherein the substrate is coated with no more than three coats of the slurry composition.

41. The method of claim 31, wherein the substrate is coated with no more than two coats of the slurry composition.

42. The method of claim 31, wherein the substrate is coated with a single coat of the slurry composition.